

## CLAIMS

What is claimed is:

*Sub A/5*

1. A method for producing spray dried particles having targeted aerodynamic properties comprising the steps of:  
(a) controlling the moisture content of a drying gas to a level selected to form spray dried particles having a targeted aerodynamic diameter or a targeted tap density;  
(b) atomizing a liquid feed to form liquid droplets; and  
(c) contacting the liquid droplets with the drying gas, thereby drying the liquid droplets to form spray dried particles having the targeted aerodynamic properties.

10 2. The method of Claim 1 wherein the drying gas is selected from the group consisting of air, nitrogen, argon and any combination thereof.

15 3. The method of Claim 1 wherein the moisture content is expressed as dew point, frost point or relative humidity.

4. The method of claim 3 wherein the dew point is in the range between about 0° C and -40° C.

5. The method of Claim 1 wherein the targeted aerodynamic diameter is less than about 5 microns.

20 6. The method of Claim 5 wherein the targeted aerodynamic diameter is less than about 3 microns.

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7. The method of claim 1 wherein the targeted tap density is less than about 0.4 g/cm<sup>3</sup>.
8. The method of Claim 7 wherein the targeted tap density is less than about 0.1 g/cm<sup>3</sup>.
- 5 9. The method of Claim 1 wherein the drying gas has an inlet temperature between about 80°C and about 200°C.
10. The method of Claim 1 wherein the drying gas has an outlet temperature between about 35°C and about 80°C.
- 10 11. The method of Claim 1 further comprising separating the spray dried particles from waste drying gas.
12. The method of Claim 1 further comprising collecting the spray dried particles.
13. The method of Claim 1 wherein the liquid feed includes a solvent selected from the group consisting of an organic solvent, an aqueous solvent or any combination thereof.
- 15 14. The method of Claim 1 wherein the spray dried particles comprise a bioactive agent.
15. The method of Claim 1 wherein the spray dried particles comprise a phospholipid.
16. Particles formed by the method of Claim 1.

17. A method for forming particles having a targeted aerodynamic diameter comprising the steps of:

- atomizing a liquid feed to produce liquid droplets; and
- contacting the liquid droplets with a drying gas having a dew point corresponding to forming particles having the targeted diameter, thereby drying the liquid droplets to form the particles.

18. A method for forming particles having a minimized aerodynamic diameter comprising the steps of:

- atomizing a liquid feed to produce liquid droplets; and
- contacting the liquid droplets with a drying gas having a dew point corresponding to forming particles having the minimized aerodynamic diameter; thereby drying the liquid droplets to form the particles having the minimized aerodynamic diameter.

15 19. A method for producing spray-dried particles of reduced tap density comprising:

- atomizing a liquid feed to produce liquid droplets; and
- contacting the liquid droplets with a drying gas having a dew point corresponding to forming particles having the reduced tap density; thereby drying the liquid droplets to form the spray dried particles.

20. A method for producing particles comprising:

(a) atomizing a liquid feed to produce liquid droplets; and

(b) contacting the liquid droplets with a drying gas having a dew point between 0° C and -40° C, thereby drying the liquid droplets and producing the particles;

5 wherein the particles have an aerodynamic diameter less than about 5  $\mu\text{m}$  and a tap density less than about 0.4 g/cm<sup>3</sup>.

21. The method of Claim 20 wherein the particles have a tap density less than about 0.1 g/cm<sup>3</sup>.

10 22. A method for producing particles suitable for inhalation comprising

(a) spraying a liquid feed comprising a biologically active agent; and

(b) contacting the sprayed liquid feed with a drying gas having a dew point corresponding to a targeted aerodynamic diameter for the particles, thereby drying the sprayed liquid feed to form the particles.

15 23. A method for producing spray-dried particles of reduced tap density comprising:

(a) atomizing a liquid feed to produce liquid droplets; and

(b) contacting the liquid droplets with a drying gas having a dew point corresponding to forming particles having the reduced tap density; thereby drying the liquid droplets to form the spray dried particles.

20 24. A method for producing particles comprising:

(a) atomizing a liquid feed to produce liquid droplets; and

(b) contacting the liquid droplets with a drying gas having a dew point between 0° C and -40° C, thereby drying the liquid droplets and producing the particles;

25 wherein the particles have a tap density less than 0.4 g/cm<sup>3</sup>.

5            25. In a method for spray-drying including atomizing a liquid feed to produce liquid droplets and drying the liquid droplets, the improvement comprising combining a gas with a vapor to form a drying gas having a specified vapor partial pressure and contacting the liquid droplets with the drying gas, thereby drying the liquid droplets.

10            26. A method for spray drying particles having a targeted tap density comprising:

- (a) correlating vapor contents of a drying gas with tap densities of particles formed by contacting a sprayed liquid feed with the drying gas;
- (b) selecting a vapor content corresponding to the targeted tap density;
- (c) generating a drying gas having said vapor content; and
- (d) contacting sprayed liquid feed with the drying gas having said vapor content, thereby producing particles having the targeted tap density.

15            27. A method for producing particles having a targeted aerodynamic diameter comprising:

- (a) correlating vapor contents of a drying gas with aerodynamic diameters of particles formed by contacting a sprayed liquid feed with the drying gas;
- (b) selecting a vapor content corresponding to the targeted aerodynamic diameter;
- (c) generating a drying gas having said vapor content; and
- (d) contacting the sprayed liquid feed with the drying gas having said vapor content thereby producing particles having the targeted aerodynamic diameter.

20            28. A method for producing spray dried particles having targeted aerodynamic properties comprising the steps of:

- (a) controlling the solvent vapor content of a drying gas to a level selected to form spray dried particles having a targeted aerodynamic diameter or a targeted tap density;
- (b) atomizing a liquid feed to form liquid droplets; and
- 5 (c) contacting the liquid droplets with the drying gas, thereby drying the liquid droplets to form spray dried particles having the targeted aerodynamic properties.